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Clinical Assessment of Anxiety Sensitivity in Children and Adolescents: Where Do We Go From Here?

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The literature on the assessment of anxiety sensitivity (AS) in children and adolescents is reviewed. Following a discussion of theoretical and developmental issues relevant to AS and anxiety disorders, the construct validity of measures of childhood AS is reviewed using J. Loevinger's (1957) threefold framework. The collective evidence suggests mixed support at present for the validity of the clinical assessment of AS in youths, owing to (a) a limited number of adequate measures, (b) insufficient data on construct validity, and (c) a deficiency of knowledge regarding the potential influence of developmental factors on AS and anxiety disorders. Limitations of the literature are summarized, and suggestions for future research are provided.

The question of why certain individuals are at higher risk for anxiety disorders than are others is one of the foremost challenges to psychopathology researchers (Barlow, Chorpita, & Turovsky, 1996). Because valid assessment is a prerequisite for rigorous research on etiology, considerable effort has been expended on the construction and validation of measures to assess potential risk factors for anxiety disorders in both children and adults. Although potential risk factors for anxiety disorders have most often been examined in adult samples, such samples are characterized by several disadvantages. Because studies of adults are typically based on individuals who have already developed anxiety disorders, it can be difficult or impossible to disentangle the antecedents of these conditions from their concomitants or sequelae. Additional problems are introduced by retrospective bias. In particular, adults may selectively recall or distort certain life history experiences that fit especially well with their implicit notions of the causes of their current problems (e.g., see Ross, 1989).

Child samples are therefore useful alternatives for investigating the antecedents of and causal risk factors for anxiety disorders. Because such samples consist of individuals who vary in their risk for later anxiety disorders, they permit researchers to investigate putative risk factors for anxiety disorders in a prospective fashion, which may permit somewhat greater confidence in cause-and-effect inferences. Moreover, there has been an increasing appreciation of the high rates of many anxiety disorders, including separation anxiety disorder and obsessive–compulsive disorder, in childhood and adolescence. Estimates of the prevalence rates of anxiety disorders among children and adolescents range from 3% to 18% (Albano, Chorpita, & Barlow, 1996). This increased appreciation of the high rates of childhood anxiety disorders has resulted in a heightened focus on the etiology of pathological anxiety in youth, and on the construction of instruments to assess risk factors for anxiety disorders in children.

The Conceptualization and Operationalization of Anxiety Sensitivity: An Overview

One construct that has received increasing attention in the adult, and more recently childhood, anxiety disorders literature is *anxiety sensitivity* (AS; Reiss & McNally, 1985; Taylor, in press). AS, which is similar to the older construct of "fear of fear" (Chambless & Goldstein, 1988), refers to the extent to which individuals believe that their own anxiety or anxiety-related sensations have harmful consequences. For example, individuals with high levels of AS often believe that a rapid heart beat is a sign of an impending heart attack. Whereas fear of fear has generally been hypothesized to be secondary to panic attacks (Chambless & Goldstein, 1988), AS has typically been posited as an antecedent of and perhaps a risk factor for panic disorder and other anxiety disorders (McNally, 1990; Reiss, 1991). High levels of AS have been hypothesized to arise from a variety of sources, including direct experiences with anxiety, observations of other individuals experiencing anxiety, and information concerning the adverse consequences of anxiety (Reiss & Havercamp, 1996; Watt, Stewart, & Cox, 1998).

The construct of AS is embedded within Reiss's (1991) expectancy theory of anxiety, which attempts to account for the origins and maintenance of anxiety in terms of individuals' beliefs and expectations concerning the probabilities of objective danger and their own anxiety reactions. According to Reiss's expectancy theory, AS increases individuals' risk for a variety of anxiety disorders, particularly panic disorder, by acting as an amplifier of preexisting anxiety. Specifically, individuals with elevated levels of AS are posited to develop anxiety in response to their own

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anxiety symptoms, resulting in a positive feedback cycle that can sometimes culminate in panic attacks.

Reiss's (1991) expectancy theory is similar to Clark's (1986) cognitive model of panic disorder, which posits that panic attacks are produced by the catastrophic misinterpretation of unusual or unexpected physical sensations. Unlike Clark's model, however, the construct of AS refers to stable individual differences in the predisposition toward the fear of anxiety symptoms. In addition, the construct of AS goes beyond Clark's model to encompass fears of not only unusual physical sensations but also of mental (e.g., racing thoughts) and publicly observable (e.g., shaky hands) experiences. With respect to the origins of individual differences in AS, Reiss's expectancy theory does not offer great detail other than to note that both direct and indirect learning experiences play a causal role. The potential genetic underpinnings of AS, as well as the etiological relations between AS and presumably broader personality variables, such as trait anxiety, fearfulness, and negative affectivity, and such temperamental dimensions as behavioral inhibition (Kagan, Reznick, & Snidman, 1987) remain largely unknown (for discussions, see Lilienfeld, Turner, & Jacob, 1996, 1998).[1]

In the adult literature, AS has typically been measured with the Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986), a 16-item questionnaire that assesses the extent to which respondents are frightened by their own anxiety and anxiety-related sensations. The test–retest reliability of the ASI over a 2-week interval was found to be acceptable in an undergraduate sample (r = .75; Reiss et al., 1986), and its internal consistency across several samples was found to be high (alphas in the test manual ranged from .82 to .91; Peterson & Reiss, 1992). In addition, the construct validity of the ASI has been supported by a number of investigations. For example, scores on the ASI are positively correlated with diagnoses of numerous anxiety disorders, including panic disorder and social phobia (Taylor, Koch, & Crockett, 1991; Taylor, Koch, & McNally, 1992), and have been found to predict anxiety reactions in response to both biological (e.g., hyperventilation, carbon dioxide inhalation; Holloway & McNally, 1987; McNally, 1989; Rapee & Medoro, 1994) and psychological (e.g., a difficult mental arithmetic task; Shostak & Peterson, 1990) challenge procedures. In addition, decreases in ASI scores over the course of treatment have been reported to accompany reductions in the symptoms of panic disorder (Telch et al., 1993). Moreover, evidence from several longitudinal studies (e.g., Maller & Reiss, 1992; Schmidt, Lerew, & Jackson, 1997) suggests that AS is a significant predictor of future panic attacks in nonclinical samples.

Anxiety Sensitivity in Children

Given the suggestion that AS may be a particular risk factor for panic disorder (McNally, 1996), the measurement of AS prior to panic disorder onset has become an important issue on theoretical and practical grounds. For example, a clinical assessment measure that allows for the detection of such a risk factor would have implications for prevention, early identification, and etiological research. To that end, Silverman, Fleisig, Rabian, and Peterson (1991) developed a modified version of the ASI for children and adolescents, the Childhood Anxiety Sensitivity Index (CASI). Another measure, the Anxiety Sensitivity Index for Children (ASIC), modeled even more closely after the ASI, was developed by Laurent, Schmidt, Catanzaro, Joiner, and Kelley (1998), but data concerning its psychometric properties are more limited. More recently, Unnewehr, Schneider, Margraf, Jenkins, and Florin (1996) developed a 5-point rating scale designed to assess fears of physical sensations in children, but presented no formal data on its psychometric properties. Overall, few measures have been developed for assessing AS in children, with the CASI being the most extensively researched.

AS is believed to intensify anxiety responses because awareness of initial symptoms (e.g., palpitations) leads to increased anxiety regarding imagined harmful consequences, amplifying these symptoms and contributing to a feed-forward cycle of escalating anxiety (Barlow et al., 1996). Thus, AS has most often been implicated in the etiology of panic disorder, which involves discrete and sudden episodes of intense anxious arousal (McNally, 1996). To establish a context for the review that follows, we find it is first necessary to provide background regarding panic disorder in children, given this syndrome's centrality in AS research and Reiss's (1991) expectancy theory.

The *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV;* American Psychiatric Association, 1994) describes two key features of panic disorder. First, individuals must experience recurrent and unexpected *panic attacks,* defined as sudden surges of anxiety accompanied by at least 4 of 13 symptoms of anxious arousal (e.g., sweating, nausea or abdominal distress, fear of dying, fear of losing control). Second, individuals must develop apprehension about future attacks or the implications of the attacks, or alter their lives in some significant manner related to the attacks. Numerous studies suggest that panic attacks are relatively common and need not involve serious clinical impairment unless accompanied by apprehension concerning future attacks (Barlow et al., 1996; Clark, 1986; Rapee, Mattick, & Murrell, 1986). Accordingly, prevalence studies have found higher rates for panic attacks than for panic disorder, the diagnosis of which requires the accompanying apprehension or alteration in lifestyle (Ollendick, Mattis, & King, 1994). For example, studies have found that 36–63% of adolescents report panic attacks (e.g., King, Gullone, Tonge, & Ollendick, 1993), whereas only about 1% of adolescents meet criteria for panic disorder (e.g., Whitaker et al., 1990).

Both of these rates change as a function of age. Specifically, children experience lower rates of both panic attacks and panic disorder than do adolescents. The collective evidence on the prevalence of panic disorder in youth suggest that it is quite rare (e.g., Anderson, Williams, McGee, & Silva, 1987; Last, Strauss, & Francis, 1987; Nelles & Barlow, 1988), although researchers have provided evidence that prepubertal panic disorder does exist (e.g., Moreau & Weissman, 1992).

One suggestion for why panic disorder is rare in children but not in adolescents concerns children's cognitive capacities. Outlining the distinction between panic attacks reported by those seeking treatment (clinical) and by those not seeking treatment (nonclinical), Norton, Dorward, and Cox (1986) concluded that clinical panic attacks (a) tend to come "out of the blue" (i.e., are not

[1]Negative affectivity is a broad personality dimension reflecting a propensity to experience negative emotions of many kinds, including anxiety, guilt, anger, and alienation (see Watson & Clark, 1984).

attributed to an external threat cue) and (b) are more often characterized by catastrophic cognitions (e.g., fears of going crazy or dying). Researchers have suggested that young children may be less capable of attributing anxiety to internal cues and of associating the sensations of anxiety with future catastrophe. For example, Nelles and Barlow (1988) reviewed findings on children's developmental changes in conceptions of illness (Bibace & Walsh, 1981), which suggested that not until Piaget's formal operational stage (at about 12 years) are children capable of attributing illness to future or internal, nonobservable causes. Vasey and Daleiden (1994) reviewed similar evidence that the content of children's anxiety is closely linked with their ability to reason about future events and cognitively elaborate negative outcomes, which are capacities that increase over the course of development.

In the first direct investigation of these ideas, Mattis and Ollendick (1997a) did not find strong support for the conclusions of Nelles and Barlow (1988) regarding developmental differences in the likelihood of internal attributions concerning somatic arousal. The investigators asked 118 children from Grades 3, 6, and 9 to listen to guided imagery regarding panic and then asked them to complete a checklist of attributions for the panic symptoms. Contrary to the hypothesis of Nelles and Barlow (1988), all children endorsed more internal than external attributions for panic, regardless of age. These findings are somewhat difficult to interpret, however, in that endorsement of simple descriptive items on the checklist (e.g., "I'd think I was scared or nervous") was scored as an internal attribution. This conceptualization is not entirely consistent with the distinctions outlined earlier by Norton et al. (1986), in which true panicogenic cognitions involve interpretation of arousal as coming "out of the blue."

In exploring these issues, Mattis and Ollendick (1997a) raised the important distinction between children's attributions regarding arousal and imagined consequences of the arousal. Indeed, the issue of whether somatic arousal arises from some external agent (e.g., "the room was too hot") or internal agent ("something was wrong with me") has frequently been conflated with the issue of whether the consequences of that arousal will be catastrophic (e.g., Chorpita, Albano, & Barlow, 1996; Nelles & Barlow, 1988). However, only the latter issue is directly relevant to Reiss's (1991) expectancy theory and thus to the development of panic disorder. Interestingly, Mattis and Ollendick (1997a) found that 3rd graders endorsed items "unlikely to be associated with panic" (p. 53) on the attributional checklist significantly more often than 6th or 9th graders. This finding is consistent with the notion that children's capacity to interpret anxiety symptoms as portending future harm (i.e., AS) differs across age groups. Because of the complexity of Mattis and Ollendick's (1997a) findings and their interpretation, however, continued investigation of these issues is needed.

Because of the absence of other studies such as that of Ollendick and Mattis (1997a), ideas about children's cognition relevant to panic disorder are often difficult to integrate with the broader literature on cognitive development. This literature suggests that children as young as 4 or 5 are capable of understanding such complex illness concepts as contamination (e.g., Kalish, 1996). Moreover, young children appear quite likely to make causal attributions about illness (e.g., "I am sick because I ate something bad"), even when such causal links are absent (Wellman & Gelman, 1998). Children seem to acquire a rudimentary knowledge of parts of the body and their relation with sickness by age 4 or 5, although this understanding is often erroneous. Overall, it is difficult at present to link these findings with the developing childhood AS literature and research on children's cognitions relevant to panic.

Recent models of the development of panic disorder specifically (Mattis & Ollendick, 1997b) and anxiety disorders in general (Chorpita & Barlow, 1998) offer several hypotheses about these issues. Both models point to the literature on temperament, attachment, and conditioning history and their role in establishing a cognitive diathesis underlying anxiety disorders. For example, Mattis and Ollendick (1997b) argued that sensitivity to anxiety symptoms may be best explained by temperamental factors such as reactivity (i.e., hyperarousal) within the autonomic nervous system and a learned association between interoceptive cues and the experience of panic. Along different lines, Chorpita and Barlow (1998) suggested that the establishment and progression of a specific cognitive risk factor could amplify anxious arousal to clinical levels. These authors suggested that certain temperamental variables (e.g., negative affectivity) and early experience with reinforcement combine to produce a cognitive diathesis that increases the likelihood that ambiguous or threatening events will be interpreted as uncontrollable, thereby intensifying anxious responding. In this manner, cues concerning somatic arousal or other experiences are more likely to become phobic stimuli. Although such theories offer an incomplete account of the development of panic disorder, they provide an important theoretical context in which to evaluate the construct of AS in children and adolescents. Within such a context, future studies of AS in children can perhaps relate the notion of catastrophic interpretation of internal cues to a broader network of temperamental constructs (e.g., somatic arousal and reactivity; Rothbart & Derryberry, 1981).

These issues raise a final important distinction that is critical to the proper evaluation of the literature on the assessment of childhood AS. Although there is disagreement over when complex cognitive attributes like AS develop, a separate issue concerns when children might be able to report on these attributes in a reliable and valid manner. That is, even if developmental arguments suggest that AS and the complex beliefs thought by some theorists (e.g., Clark, 1986) to underlie panic disorder arise early in childhood, it remains to be determined whether children can accurately report their levels of these variables on a questionnaire. In other words, it is conceivable that the assessment of childhood AS by means of self-report constitutes a *method–mode mismatch* (i.e., the use of an assessment method that is inappropriate for the construct of interest; Haynes, Richard, & Kubany, 1995). In summary, some of the very considerations that make the assessment of childhood AS so potentially important also make it complex and controversial.

The Construct Validity of Measures of Childhood AS

In the remainder of this article, we build on the aforementioned considerations to examine the construct validity of measures of childhood AS. Loevinger (1957) delineated three components of construct validity: *substantive validity, structural validity* (these first two forms of validity comprise what Loevinger termed "internal validity"), and *external validity* (for more recent expositions of construct validity, see Embretson, 1983; Hogan & Nicholson, 1988; and Messick, 1995). Because Loevinger's scheme provides

a useful and comprehensive model of the construct validation process, we use it as an overarching framework for evaluating the validity of the CASI and other childhood AS indexes.

According to Loevinger (1957), substantive validity refers to the extent to which the content of the items on a test are consistent with the investigator's theory regarding the trait being assessed. Substantive validity is thus similar to content validity (see Haynes et al., 1995, for a review of content validity in personality and behavioral assessment), although it differs from this concept in one important way. Specifically, Loevinger argued that a test's initial item pool should be overinclusive, and it should include competing theoretical conceptualizations of the trait to be measured. Only in this way, Loevinger maintained, can the investigator ascertain the boundaries of the trait through the process of test construction and arrive at a final item pool that adequately captures the trait to be measured (see also Tellegen & Waller, 1994). The use of an overinclusive item pool early in the test-construction process thereby decreases the likelihood that a test's substantive validity will ultimately be compromised by *construct underrepresentation* (Messick, 1995), that is, the failure to assess all important components of the construct.

Structural validity refers to the extent to which the relations among the items of a measure correspond to theoretical expectations. For example, if a measure is hypothesized to assess a unitary construct, factor analyses of this measure should reveal a single factor structure at either a lower order or higher order level. The latter possibility would entail a hierarchical factor structure, with correlated lower order factors coexisting with a general or higher order factor. Both factorial validity (Guilford, 1946; see also Cronbach & Meehl, 1955), namely, the extent to which a measure's factor structure is consonant with the investigator's conceptualization of the trait being measured, and internal consistency estimates are relevant to structural validity.

Finally, external validity refers to whether the measure's relations with extra-test correlates accord with theoretical prediction. The investigator ascertains external validity by first delineating an explicit nomological network (Cronbach & Meehl, 1955) of predictions surrounding the measure of interest. This nomological network permits the investigator to examine the test's external validity by generating predictions concerning the relations of the latent trait ostensibly assessed by this test to measurable variables. The riskier these predictions are from a theoretical standpoint (i.e., the lower their a priori probability absent the investigator's theory; see Meehl, 1978), the more diverse these predictions are, and the more of these predictions are corroborated, the more compelling the evidence for the test's construct validity (Cronbach & Meehl, 1955). Because external validity incorporates both convergent and discriminant validity (Campbell & Fiske, 1959), it is essential for the test developer to be explicit regarding not only the variables with which the test is expected to correlate, but also the variables with which the test is not expected to correlate (or at least not correlate highly).

Substantive Validity

Item development. In developing the CASI, Silverman et al. (1991) adapted items from the ASI to make them more appropriate for children. For example, the item "It scares me when I am nauseous" was changed to "It scares me when I feel like I am going to throw up." In developing the ASIC, Laurent et al. (1998) followed a similar procedure. The authors of the CASI also added the following two new items to the scale: "I don't like to let my feelings show" and "Funny feelings in my body scare me." Items from both the CASI and the ASI are shown in the Appendix.

Adaptation of a new measure from an existing questionnaire raises potential issues about content validity. Haynes et al. (1995) argued that content validity requires clear specification of the domain to be sampled, which includes (a) specification of what the target domain includes and does not include, (b) development of an appropriate item pool for that domain, and (c) representative distribution of items across possible facets of the domain. For complex constructs, item development usually benefits from incorporating multiple strategies, such as the inspection of other measures, the review of suggestions from experts, evaluation of literature on the target construct, and theoretical and clinical deduction. Given the evidence that the AS construct is multifactorial in adults (e.g., Telch, Shermis, & Lucas, 1989), development of a measure of childhood AS would ideally involve sampling from an overinclusive domain.

Variation of the wording of items might help to detect subtle differences in response topography and enhance the substantive validity of childhood AS measures. For example, little is known about how such items as "It scares me when my heart beats fast," (Item 6 from the CASI) would function compared with such hypothetical items as "It is bad for me when my heart beats fast" (intended to index a belief), "When I get scared, my heart beats fast" (intended to index an affective sequence), or "My heart beats too fast" (intended to index level of arousal). Evaluation of such variations would help to clarify the boundaries of the AS construct as well as to reveal what elements index potential risk factors for panic disorder.

The CASI demonstrates a paucity of items assessing the cognitions ostensibly associated with the AS construct. Although AS is conceptualized within Reiss's (1991) expectancy theory as a cognitive construct, reflecting beliefs that anxiety symptoms have harmful consequences, items on the CASI (see Appendix) appear to refer primarily to affective reactions to anxiety rather than to beliefs concerning the adverse effects of anxiety. This problem is equally true of the ASIC. Consequently, the implications of findings based on the CASI and ASIC for Reiss's (1991) expectancy theory are not entirely clear.

The assumption underlying the items on the CASI and ASIC (as well as the items on the ASI; Lilienfeld, Jacob, & Turner, 1989; Lilienfeld et al., 1998) appears to be that affective reactions to anxiety are a consequence of cognitive appraisal. However, Zajonc (1984) and others (e.g., Izard, 1984) argued that affect can operate independently of, and even exert a causal influence on, cognition. Moreover, the work of LeDoux (1995, 1996) demonstrates that certain anxiety reactions, particularly those involving a preliminary evaluation of stimulus threat value, can occur almost immediately and without cortical involvement (see also Rosen & Schulkin, 1998). As a consequence, the assumption that emotional reactions to anxiety necessarily require prior cognitive appraisal may be difficult to defend.

Additional criticisms of the substantive validity of both the CASI and ASIC concern the relatively small number of items devoted to social fears. Inspection of the Appendix, for example, reveals that only two items on the CASI (Items 1 and 17) appear

to refer directly to the adverse social consequences of anxiety. The ASI has similarly been criticized for its inadequate representation of social anxiety (Telch et al., 1989). Because physical and social anxiety tend to be only weakly or moderately correlated (Lykken, Tellegen, & Katzenmeyer, 1973), the inclusion of additional items assessing social fears might yield a broader and perhaps more valid operationalization of the AS construct.

Finally, a number of the items on the CASI (e.g., Items 2 and 15; see the Appendix) contain references to symptoms frequently experienced during panic attacks, such as fears of going crazy (American Psychiatric Association, 1994). Other items on the CASI (e.g., Items 3, 4, 8, and 13; see the Appendix) refer explicitly to physical symptoms common during panic attacks, such as shakiness, nausea, and faintness. The inclusion of such items renders correlations between the CASI and measures of panic symptoms (see *External Validity,* below) difficult to interpret, because such correlations are potentially attributable to the tendency of panic patients to endorse items assessing their own symptoms. This problem of tautology has similarly been noted for the ASI (Lilienfeld, Turner, & Jacob, 1993; Lilienfeld et al., 1996; see also Nicholls, Licht, & Pearl, 1982, for a general discussion of this problem in personality assessment).

Developmental considerations. Two important considerations in developing measures for younger children are (a) the potential for developmental shifts in the capacity to experience or describe the trait and (b) possible shifts in the nature of the trait across age. For example, test items may attempt to assess phenomenology that young children are not capable of recognizing, experiencing, or explaining (e.g., mortality of self, identity disturbance, depersonalization). In addition, items that best identify a construct at one age may be different at another age (cf. the Child Behavior Checklist; Achenbach, 1991). At present, little is known about the item properties of the CASI as a function of age. However, Chorpita and Daleiden (1998) found that nonautonomic items (e.g., "When I am afraid, I worry that I might be crazy") demonstrated lower correlations with panic-disorder severity in younger children than in adolescents, suggesting that the validity of these items for at least some criteria may change across development.[2] In summary, the complexity of these developmental issues as well as the potential limitations of the item pools for child AS measures suggest that the substantive validity of the CASI and ASIC may benefit from additional efforts in test development or adaptation.

Structural Validity

The CASI has been found to be internally consistent (Silverman et al., 1991, reported Cronbach's alphas of .87 in two child samples). However, internal consistency is a necessary, but not sufficient, condition for unidimensionality or homogeneity (Green, Lissitz, & Mulaik, 1977). Consequently, it is necessary to examine the CASI's factor structure to determine whether it can be considered to assess a unitary construct. In the adult literature, there is converging evidence that the factor structure of the ASI is hierarchical, with several oblique (i.e., intercorrelated) lower order factors (e.g., anxiety concerning physical sensations, anxiety concerning mental incapacitation) that in turn load on a higher order AS factor (Lilienfeld et al., 1993; Zinbarg, Barlow, & Brown, 1997).

Silverman and Weems (in press) reported the results of a confirmatory factor analysis (CFA) performed on the CASI. This CFA involved two samples, one of 248 children with anxiety disorders aged 7 to 16, and the other of 252 unselected schoolchildren aged 7 to 12. The results of the CFA suggested that the internal structure of the CASI is best explained by a correlated three-factor model, with the three factors being Physical Anxiety, Control, and Worry. In addition, a correlated four-factor model characterized by an additional factor of Social Anxiety appeared to fit the correlational data equally well, although the Social Factor consisted of only two items and was not highly internally consistent. As noted previously, the CASI, like the ASI, may not provide adequate coverage of concerns regarding social anxiety. Consequently, the findings reported by Silverman and Weems (in press) may indicate only that concerns regarding the adverse effects of social anxiety are underrepresented in the CASI item pool.

A recent CFA with a large clinical sample suggests that the factor structure of the CASI differs across age groups (Chorpita & Daleiden, 1998). The investigators examined both the item properties and factor structure of the CASI in 228 children and adolescents with anxiety disorders. Although a one-factor model best accounted for the data when age was not considered, a better fitting model posited a single factor for children (aged 7–11) and a two-factor structure for adolescents (aged 12–17). The two-factor structure was based on rational assignment of items to autonomic factor and nonautonomic factors. These findings highlight the potential importance of developmental considerations in investigations of structural validity.

Laurent et al. (1998) reported preliminary data on the structural validity of the ASIC. The alphas for the ASIC ranged from .85 to .90 across three samples (*Ns* = 95, 112, and 144), the first sample of which consisted of unselected school children and the latter two samples of which were selected for high levels of anxiety, depression, or both. The results of exploratory factor analyses (EFAs) across these three samples suggested that the ASIC possesses a two-factor structure. Specifically, Laurent et al.'s analyses suggested the presence of a Fear of Physiological Arousal factor and a Fear of Mental Catastrophe factor. Although these findings are consistent with the possibility that the construct of childhood AS is not unitary, it will be necessary to replicate these findings using CFA, which is free of some of the largely arbitrary decisions (e.g., method of rotation) that render EFA problematic, and to examine the structure across different age groups. Although Laurent et al.'s results did not reveal a Fear of Social Anxiety factor, this negative finding may again reflect an underrepresentation of social anxiety items in the initial item pool.

External Validity

Theoretical concerns. In the area of child AS, analyses of external validity face the challenge of finding adequate criterion measures or groups. For example, the limited number of valid measures of childhood anxiety (e.g., Chorpita, Albano, & Barlow,

[2]Technically, most or all the variables used for the external validation of childhood AS measures should probably be referred to as "quasi-criteria" rather than criteria (see Burisch, 1984), as criteria traditionally refer to variables that are largely infallible indices of the constructs they are intended to assess (see also Cronbach & Meehl, 1955). For the sake of simplicity, however, such variables will be referred to as *criteria* in the remainder of this article.

1998; Perrin & Last, 1992) limits possibilities for both convergent and discriminant validity analyses for the CASI and other new measures of childhood AS. The problem is compounded by the absence of a clearly articulated nomological network for the construct validation of AS (Cronbach & Meehl, 1955). Because the developers of the AS construct (e.g., Reiss, 1991) have not been explicit concerning the relations of AS to other constructs such as trait anxiety, fearfulness, or somatic arousal (Lilienfeld et al., 1996), it is not entirely clear what predictions should be made concerning the relations of the CASI and other childhood AS measures to these constructs.

This issue raises difficulties for research on the CASI. For example, Silverman et al. (1991) originally used a trait anxiety measure as a convergent criterion in developing the CASI, whereas more recently Weems, Hammond-Laurence, Silverman, and Ginsburg (1998) stated that the "use of trait anxiety as the criterion variable is methodologically limited because of claims that anxiety sensitivity is not parsimoniously distinguished from trait anxiety" (p. 70). Such contradictions stem largely from the difficulty of establishing a strong theoretical context in childhood AS research and is indicative of the challenges that researchers in this area have confronted.

As mentioned earlier, Chorpita and Barlow (1998) and Mattis and Ollendick (1997b) suggested that other constructs such as fearfulness, reactivity, or somatic arousal may be more appropriate validity criteria for AS. Such constructs have recently received increased attention in investigations of the tripartite model of emotion (Clark & Watson, 1991) in childhood (Chorpita et al., 1998; Joiner, Catanzaro, & Laurent, 1996). The tripartite model posits a general factor, Negative Affect, involving a temperamental sensitivity to negative stimuli (Watson, Clark, & Harkness, 1994), as a common influence on anxiety and depressive disorders, along with two specific factors, (low) Positive Affect (specific to mood disorders) and Autonomic Hyperarousal (specific to anxiety disorders).[3] Along these lines, Chorpita and Daleiden (1998) argued that the CASI must be demonstrated to possess discriminant validity from measures of potentially similar constructs such as Clark and Watson's (1991) Autonomic Hyperarousal. Overall, research on AS measures must contend with the emerging child anxiety literature, which is still in the process of articulating a definitive nomological network.

Between-groups differences. In their initial report, Silverman et al. (1991) evaluated the CASI in a clinical sample with a variety of diagnoses. Means were calculated for those groups represented by four or more diagnoses and were as follows: adjustment disorder with mixed emotional features ($M = 28.17$, $SD = 5.61$; $n = 6$) and attention deficit hyperactivity disorder (ADHD; $M = 32.86$, $SD = 9.29$; $n = 7$). The estimated population effect size (ω^2) for this group difference is 0.01, interpreted as the percentage of variance in the CASI explained by group. The scores for 3 participants with anxiety disorders (specific disorders were not reported) were 27, 27, and 25. These results do not support the external validity of the measure, particularly given that the highest scores were among children with ADHD. According to Reiss's (1991) expectancy theory, there is no reason to expect children with ADHD to be more likely than other children to believe that symptoms of anxiety are dangerous. Nevertheless, because these results are based on a very small number of participants, any conclusions should be made with caution.

In another evaluation of group differences, Rabian, Peterson, Richters, and Jensen (1993) compared groups of children with anxiety disorders, children with externalizing disorders, and children with no disorders. Participants were recruited from an epidemiological study involving a military community. Diagnostic groups were "pure" in that the inclusion criteria did not permit either externalizing disorders among the anxious children or anxiety disorders among the externalizing children. The anxiety-disorders group had a low rate of other disorders (i.e., 66% met criteria for only one disorder) and represented *DSM–III–R* diagnoses of separation anxiety disorder, overanxious disorder, avoidant disorder, simple phobia, social phobia, and generalized anxiety disorder. No cases of panic disorder were reported. In the externalizing group, 20 children were assigned a diagnosis of ADHD, and the remainder had diagnoses of oppositional defiant disorder or conduct disorder.

The results demonstrated that children with anxiety disorders ($M = 30.56$) scored higher than children with no diagnosis ($M = 26.40$). Contrary to prediction, however, the children with anxiety disorders did not score significantly higher than children with externalizing disorders ($M = 28.84$), although differences were in the expected direction.[4] In reviewing a number of possible explanations for this finding, the investigators suggested that the absence of panic disorder in the sample may have accounted for a lower group mean for the anxiety-disorder group. It should be noted, however, that although Reiss's (1991) expectancy theory emphasizes the relation between AS and panic disorder (see pp. 148–150), this theory posits that AS is a risk factor for all anxiety disorders (see also Taylor et al., 1992). Thus, Reiss's expectancy theory would predict significantly higher scores among a nonpanic anxiety group compared with a psychiatric group without anxiety disorders. In general, the results again do not strongly support the external validity of the CASI, although low statistical power may account for Rabian et al.'s negative finding.

Kearney, Albano, Eisen, Allan, and Barlow (1997) further examined the external validity of the CASI within the context of a larger evaluation of the phenomenology of panic disorder in youth. The investigators compared a sample of children diagnosed with panic disorder ($n = 20$) with a sample of children with other anxiety disorders ($n = 20$). The mean CASI scores for the panic-disorder group and the comparison group were 34.58 and 28.32, respectively. These differences were statistically significant ($\omega^2 = 0.09$). Nevertheless, the interpretation of these findings is complicated by a potentially serious confound: The comparison groups were recruited at different settings and assessed by different interviewers. Moreover, the panic-disorder group scored significantly higher on the State–Trait Anxiety Inventory for Children—Trait Version (STAIC–T; Spielberger, 1973; $M = 39.74$) than the nonpanic group ($M = 32.00$), and the

[3] Although the tripartite model initially implicated autonomic hyperarousal as relevant and specific to the anxiety disorders in general (Clark & Watson, 1991; Watson et al., 1994), recent evidence suggests that autonomic hyperarousal appears to be more related to particular anxiety disorders such as panic disorder, and less related to other anxiety disorders such as generalized anxiety disorder (Brown, Chorpita, & Barlow, 1998).

[4] Computation of effect size was not possible here, as standard deviations were not reported by Rabian et al. (1993).

effect size for this difference ($\omega^2 = 0.13$) exceeded that found with the CASI.[5] Although an analysis of covariance controlling for STAIC–T scores would have provided a stringent test of the CASI's incremental validity over and above trait anxiety, this analysis was not conducted.

Because of the difficulty of conducting large controlled studies with clinical samples, it is often preferable for practical reasons to design validation studies using analogue samples. One such study was conducted by Lau, Calamari, and Waraczynski (1996). A sample of 77 high school students aged 14 to 18 years was administered the revised Panic Attack Questionnaire. This measure gathers information about such panic features as the number of attacks (cued or uncued) in the past week, degree of disturbance caused by the attacks, and the maximum number of panic attacks (cued or uncued) during any 4-week period. No psychometric data are available for the revised Panic Attack Questionnaire, and the protocol for scoring differs across studies.

Using this instrument, Lau et al. (1996) observed that 39% of their sample could be classified as panickers. Those classified as panickers demonstrated a mean CASI score of 32.20 ($SD = 4.77$), whereas those classified as nonpanickers demonstrated a mean of 27.66 ($SD = 4.36$). This difference was statistically significant ($\omega^2 = 0.18$). Although the measure used to create criterion groups had largely unknown psychometric properties, this finding provides some of the strongest available support for the validity of the CASI. Nevertheless, concerns exist about the relation between panic disorder and panic attacks as assessed by the PAQ. For example, a large body of evidence demonstrates that unexpected or uncued attacks are a key feature of panic disorder, and that cued attacks per se may not be closely related to panic disorder (Barlow et al., 1996). The distinction between cued and uncued attacks was not evaluated in the Lau et al. study.

One recent study of AS in youth was conducted using the ASI rather than the CASI or the ASIC (Hayward et al., 1997). Participants were 1,013 seventh- and eight-grade girls who were assessed using sections of the Structured Clinical Interview for *DSM–III–R* Nonpatient Version (SCID-NP; Spitzer, Williams, & Gibbon, 1987). On the basis of information from the interview, the sample was divided into the following three groups: (a) panic disorder (meeting *DSM–III–R* criteria, $n = 17$), (b) panic attack (a history of at least one cued or uncued panic attack but not panic disorder; $n = 38$), and (c) panic free (no history of panic attacks or panic disorders; $n = 958$). Half of the panic attack group ($n = 19$) experienced at least one uncued attack. ASI scores differed significantly between the panic disorder group ($M = 25.1$) and the panic attack group ($M = 14.3$; $\omega^2 = 0.15$). These two groups did not differ on self-reported depression, but both differed from the panic free group, suggesting that the ASI was not merely measuring depression or negative affect.

These results suggest that the ASI can discriminate groups that differ in their levels of apprehension about future attacks or implications of the attacks, or change in behavior related to attacks. As noted previously, the apprehension that develops after early panic attacks is believed to be a key factor in the development of panic disorder (Barlow et al., 1996) and overlaps with AS as conceptualized by Reiss's (1991) expectancy theory. Nevertheless, it is difficult to determine to what degree the differences in ASI scores between the panic disorder and panic attack groups were due to apprehension about attacks as opposed to frequency of attacks or autonomic hyperarousal (i.e., the groups may have also differed on frequency or intensity of panic-related arousal). Comparison of the panic disorder group with the subset of the panic attack group that experienced uncued attacks might have provided an even stronger test of the ASI's relation to panic disorder versus panic attacks.

Correlation with dimensional indices. To date, the only study to examine the convergent and discriminant correlates of the CASI in a nonclinical sample is the original publication on this measure (Silverman et al., 1991). In a sample of 76 school children in Grades 7 through 9, the CASI demonstrated a 2-week test–retest reliability of .76. The CASI correlated significantly with a measure of fear (Fear Survey Schedule for Children—Revised, FSSC–R; Ollendick, 1983) at $r = .74$ and .64 and correlated significantly with a measure of trait anxiety (STAIC–T) at $r = .64$. In addition, the CASI correlated significantly with a newly developed eight-item measure of anxiety frequency (Child Anxiety Frequency Checklist, CAFC; Silverman et al., 1991) at $r = .51$ and .30. To demonstrate that the CASI predicted variance above and beyond the CAFC in FSSC–R and STAIC–T, the authors used hierarchical regression analyses. Results showed that the CASI accounted for 48% of the variance in FSSC–R scores above and beyond the CAFC and accounted for 15% of the variance in STAIC–T scores above and beyond the CAFC.

One might conclude that the CASI predicts unique variability in such dimensions as trait anxiety above and beyond frequency of anxious arousal. Nevertheless, it is important to evaluate more closely Silverman et al.'s (1991) analyses involving the CAFC. Although Silverman et al. reported that the CAFC "evaluates the frequency of the exact symptoms represented on the CASI" (p. 164), the CAFC actually assessed only seven of the autonomic symptoms on the CASI, did not include any nonautonomic symptoms (e.g., fear of losing control), and contained an item to assess frequency of diarrhea that was not contained on the CASI. Thus, the CASI was virtually guaranteed to predict variance above and beyond that of the CAFC, because it assesses symptoms that the latter measure does not. The analyses are further limited by the fact that the CAFC was not evaluated psychometrically prior to this study, and even in the 1991 report, it evidenced both poor validity (its correlation with the FSSC–R was .27) and relatively low reliability (2-week test–retest $r = .58$).

In a second study, Silverman et al. (1991) evaluated the CASI among 31 children aged 8 to 15 recruited from a psychiatric clinic. Participants were mainly boys (71%), and the group was diagnostically heterogeneous. Children were asked to complete the CASI, the CAFC, the STAIC–T and two factors of the FSSC–R (Factor 2, Fear of the Unknown; and Factor 3, Fear of Injury and Small Animals). Analyses involved stepwise regres-

[5] Kearney et al. (1997) reported that significant differences were not found on the STAIC–T. However, this conclusion was based on a smaller sample size of 37 in the *t* test using the STAIC–T (vs. 40 using the CASI) that was not reported in the original publication (C. A. Kearney, personal communication, January 25, 1999). Thus, the suggestion that CASI scores differentiated groups better than trait anxiety scores is misleading.

sion using the same variables as in the aforementioned study. Although the pattern of findings was the same, the use of the CAFC introduces the same limitations and interpretational difficulties. The 1-week test–retest reliability of the CASI was .79, which was similar to the coefficient found in the first study. Also, its correlation with the STAIC–T was $r = .62$, which was again similar to the coefficient found in Study 1. In general, the results provided initial support for the robustness of the test–retest and validity findings from Study 1, corroborating that the CASI demonstrates acceptable reliability and convergence with trait anxiety. Other results were somewhat difficult to interpret, however, given the shortcomings of the CAFC.

In a subsequent study, Kearney et al. (1997) evaluated the convergent and discriminant properties of the CASI in a sample of 20 children aged 8 to 17 diagnosed with panic disorder. The CASI correlated with the FSSC–R at $r = .75$, and with the STAIC–T at $r = .58$, replicating the results of Silverman et al. (1991). Thus, in individuals with panic disorder, the CASI appears to be related to other self-report measures of anxiety.

A large sample evaluation of the external validity of the CASI was conducted by Chorpita et al. (1996). Like Silverman et al. (1991), these investigators were interested in evaluating whether the CASI demonstrated incremental validity above and beyond other measures. Essentially, these tests involved replications of the regression analyses of Silverman et al. (1991) with three differences: (a) the sample was defined by presence of an anxiety disorder, (b) the covariates had improved psychometric properties (relative to the CAFC), and (c) analyses were extended to examine the moderating influence of age on the CASI's validity. Using responses from 112 children and adolescents with anxiety disorders aged 7 to 17, Chorpita et al. (1996) used the same convergent criterion as Silverman et al., namely, the STAIC–T. In the first regression analysis, the FSSC–R was selected as the initial predictor, with the logic that fearfulness and fear of arousal might be sufficiently similar constructs to represent a stringent test of the CASI's incremental validity. In a second analysis, the Physiological Worry scale of the Revised Children's Manifest Anxiety Scale (RCMAS) was used as the initial predictor. Items on this scale (e.g., "my heart beats fast") assess physiological arousal, and the scale was chosen with the logic that the CASI should demonstrate incremental validity above and beyond somatic arousal level.

In both sets of analyses, the CASI accounted for unique variance above and beyond the FSSC–R or the RCMAS subscale in participants aged 12 to 17, providing support for the CASI's construct validity. In the group of children aged 7 to 11, however, no incremental validity was demonstrated. Further, multiple regression analyses using age as a continuous moderator indicated that the incremental validity of the CASI increased as a curvilinear function of age. Specifically, as children became older, the CASI predicted greater variance in trait anxiety above and beyond the FSSC–R or the RCMAS. These findings are noteworthy given their consistency with notions regarding the development of cognitive vulnerabilities that might underlie panic and other anxiety disorders (e.g., Chorpita & Barlow, 1998; Mattis & Ollendick, 1997b).

Silverman and colleagues (Weems et al., 1998) undertook a partial replication of the work of Chorpita et al. (1996) by evaluating the CASI in another large sample of 280 anxiety disordered children and adolescents. The researchers repeated the between-groups regression comparisons of Chorpita et al. (1996) and found in contrast that the CASI predicted unique variance in STAIC–T scores for children (7–11) and adolescents (12–17) when the RCMAS subscale and the FSSC–R were statistically controlled. These results represent a failure to replicate Chorpita et al.'s finding that the incremental validity of the CASI is low among children aged 7–11.

However, other analyses of Weems et al. (1998) rendered their conclusions difficult to interpret. Rather than replicating the moderated regression tests of Chorpita et al. (1996), the investigators proceeded with moderated regression analyses using a different criterion measure, namely, the FSSC–R. Although the investigators concluded that their findings demonstrated a failure to replicate the moderated regression results of Chorpita and colleagues, this conclusion was based on different analyses. Additional research is necessary to explicate the source of inconsistency between the studies of Chorpita et al. (1996) and Weems et al. (1998). Because findings concerning the convergent and incremental validity of the CASI are mixed, confidence in this measure's external validity awaits additional investigation.

Some recent data on the CASI further speak to these issues. As noted earlier, Chorpita and Daleiden (1998) identified a subset of items on the CASI that were classified as autonomic in content. In a sample of 228 children and adolescents with anxiety disorders, the investigators evaluated the convergent and discriminant validity of the autonomic items, the nonautonomic items, and the full scale. Panic-disorder severity was used as the convergent criterion, and generalized anxiety-disorder severity as the discriminant criterion. The latter selection was based on (a) theoretical predictions that AS is more closely related to panic disorder than to other anxiety disorders, including generalized anxiety disorder (McNally, 1996), and (b) findings indicating that the ASI scores of patients with panic disorder significantly exceed those of patients with generalized anxiety disorder (Taylor et al., 1992). The results showed that the autonomic items uniformly performed as well or better than the full CASI scale, and that the nonautonomic items accounted for no meaningful variance in the convergent criterion. Both the autonomic and full CASI scales were weakly correlated with generalized anxiety-disorder severity, suggesting adequate discriminant validity. Sensitivity and specificity analyses yielded essentially identical results to those above.

These results imply that the nonautonomic items may not represent a meaningful factor in younger children or predict meaningful variance in panic-disorder severity in children or adolescents. This latter issue may be a function of inadequate representation of the domain, as noted earlier with respect to the paucity of items on the CASI assessing social concerns. Although the autonomic items demonstrated good convergence with panic disorder, some questions remain about their validity. It is unclear to what degree these items may measure autonomic arousal as opposed to AS. Additional investigation of larger sets of items from multiple domains (e.g., autonomic, fear of mental catastrophe, social embarrassment) may clarify some of these issues. Designs such as that of Hayward et al. (1997), which investigated which item sets best discriminate nonclinical panic attacks from panic disorder and at which ages, may be helpful in future studies.

Clinical Assessment Issues: Problems and Prescriptions

Silverman and other investigators (also see Laurent et al., 1998) are to be commended for their efforts to extend the assessment and conceptualization of AS to children and adolescents. Nevertheless, research on child and adolescent AS would be facilitated by consideration of several critical theoretical issues. Future research needs to articulate more carefully (a) the intended functions of childhood AS measures (e.g., prediction of panic disorder, diagnosis of panic disorder, prediction of panic attacks, discrimination of selected anxiety disorders from other disorders), (b) the relation of AS to existing constructs (e.g., autonomic arousal, behavioral inhibition, negative affectivity), and (c) the nature of the AS construct in children and adolescents (e.g., whether AS is principally a cognitive or affective construct). Each of these three issues suggests possible research avenues that should help to clarify the construct validity of childhood AS measures and provide further clues to the etiology and correlates of AS. Given that our principal suggestions concern the substantive and external validity of childhood AS measures, we organized our recommendations around these two components of construct validity below.

Substantive Validity

1. New investigations of the assessment of childhood AS will benefit from increased sampling of the theoretical domain. Accumulating evidence suggests underrepresentation of the social and mental catastrophe facets of AS (Silverman & Weems, in press), as well as potentially problematic construct validity for these nonautonomic facets as measured by the CASI (Chorpita & Daleiden, 1998). The development of new items would help to address questions concerning the relative importance of cardiac, respiratory, mental catastrophe, and social dimensions to the AS construct.

2. Future investigations should seek to clarify whether AS is primarily cognitive or affective in nature. At present, the CASI and other AS measures do not clearly separate beliefs from the affective responses putatively elicited by these beliefs. One goal of developing new and more varied items to assess AS in children and adolescents would be to clarify whether AS is primarily a cognitive or an affective construct, or even whether this distinction can be meaningfully established using self-report in children.

3. Studies of the CASI and other measures of childhood AS should incorporate careful investigation of lower age boundaries. Although preliminary investigations have been conducted on this issue, the data are equivocal. Furthermore, more sophisticated investigations may be necessary to tease apart (a) the age at which AS emerges and (b) the age at which AS can be validly measured through self-report. Such investigations will necessarily involve multimodal assessment and will likely need to incorporate literature on nonclinical panic and related affective responses. Once appropriate behavioral or physiological manifestations of AS are identified (e.g., avoidance, escape, or arousal during breath-holding or other interoceptive challenge exercises), establishing the convergence of self-report measures of AS with such indexes will be paramount. Evaluation of the moderating effects of age on convergent and incremental validity should provide additional insights regarding the age-appropriateness of childhood AS measures.

4. The conceptualization and assessment of childhood AS might be informed by a consideration of the broader developmental literature, including research on children's understanding of illness, the future, and death (e.g., Cuddy-Casey & Orvaschel, 1997; Speece & Brent, 1984). Although none of the items on either the CASI refers explicitly to death, some of these items (e.g., Items 6 and 9; see the Appendix) may validly assess the construct of AS only if the respondent possesses at least a rudimentary understanding of the potentially serious consequences of certain catastrophic events (e.g., a heart attack). Put somewhat differently, the meaning of the construct assessed by the CASI and other measures of childhood AS may change depending on children's understanding of death or the consequences of serious illness. Most studies suggest that children do not generally acquire a full understanding that death is both irreversible and inevitable until about age 9, and that children's understanding of these concepts is positively correlated with levels of intelligence and cognitive development (Cuddy-Casey & Orvaschel, 1997). In addition, improved understanding of children's inferences about the possible origins of disease or future harm, specifically regarding whether such outcomes might have psychological origins, may provide important information about children's potential to interpret interoceptive cues as dangerous (Wellman & Gelman, 1998). Future research would benefit from developmental evaluations of children's cognitions as potential moderators of the validity of childhood AS measures.

External Validity

1. In contrast to the adult AS literature, which has examined the construct validity of AS with a variety of criteria (including physiological responses to challenge procedures), the childhood AS literature has been exclusively limited to self-report and interview indexes. The extensive reliance on self-report measures as validation criteria is especially problematic, as it is unclear to what extent the convergent correlations between the CASI and other questionnaires are attributable to method covariance (Campbell & Fiske, 1959). An increased use of physiological indexes in the childhood AS literature could also help to address the potential problem, noted earlier, of a tautological relation between the CASI and measures of panic disorder. For example, if it could be demonstrated that the CASI was predictive of panic-like responses to challenge procedures even among individuals with no history of panic symptoms, this would bolster the contention that the relation between the CASI and measures of panic is not exclusively a consequence of essentially tautological content overlap (e.g., Nicholls et al., 1982). Such studies have been conducted in the adult literature using the ASI (McNally, 1996), but have yet to be performed in child or adolescent samples.

2. Another major shortcoming of the childhood AS literature is mono-operation bias (Cook & Campbell, 1979). Relatively few measures of childhood AS have been developed, and only the CASI has been subjected to multiple empirical tests. Moreover, we were unable to locate any studies in which more than one measure of childhood AS was administered to the same sample. Because multiple operationalizations of constructs typically result in an

increase in construct validity (Cole, Howard, & Maxwell, 1981), some of the extant literature on childhood AS may underestimate the predictive capacity of the AS construct. We encourage investigators to develop and use alternative measures of childhood AS in future research. In particular, rather than adhering strictly to the item format and content of the ASI, researchers may want to develop measures of childhood AS on the basis of alternative operationalizations, including those tied more explicitly to the cognitive features of AS or those placing a greater emphasis on social rather than physical concerns. Multiple indexes of childhood AS could be used in structural equation modeling studies to better converge on the latent construct of AS.

3. One problem with measures of children's internalizing symptoms, including the CASI, is their failure to discriminate consistently groups that should in theory differ in anxiety or fear (e.g., Perrin & Last, 1992; Rabian et al., 1993). A measure of AS for children and adolescents should discriminate known groups, whether cued versus uncued panickers, panic disorder versus other anxiety disorders, and anxiety disorders versus behavior disorders. As noted above, such criterion groups should be deduced from theoretical predictions concerning the correlates of AS.

4. Longitudinal studies of AS in childhood could provide evidence for the predictive validity of the CASI and related measures. In addition, if it could be demonstrated that AS measures in childhood predict panic attacks in later childhood or adolescence, then this would strengthen the argument that the association between childhood AS and panic is not a tautological consequence of content overlap. Longitudinal studies of childhood AS will be most meaningful, however, if they include measures of constructs believed by the proponents of the AS construct to be separable from AS, such as trait anxiety and arousal level. Investigators conducting such studies could use hierarchical multiple regression techniques to examine the incremental validity of the CASI and related indexes above and beyond these putatively different constructs, as well as to examine whether the predictive validity of these indexes is moderated by age. In addition, investigators conducting longitudinal studies are urged to incorporate measures of temperamental variables, such as behavioral inhibition to novel stimuli (Kagan et al., 1987), which has been found to be a predictor of later anxiety disorders (Turner, Beidel, & Wolff, 1996). The inclusion of measures of behavioral inhibition could permit researchers to use causal modeling techniques to examine the hypothesis that behavioral inhibition, in conjunction with other temperamental or personality traits and early adverse environmental experiences, gives rise to a more specific disposition to fear one's own anxiety symptoms (Lilienfeld et al., 1998).

As outlined here, the task of investigating these issues will not be easy. There are few measures of AS in children, limited data on these measures' construct validity, and a paucity of findings regarding the influence of developmental factors on both the emergence and valid assessment of AS. New studies are needed to test the substantive, structural, and external validity of measures of AS in children and to develop alternative or revised measures of this construct. A better understanding of the childhood AS construct and its measurement will require considerable additional investigation, but whether future efforts are filled with discovery or disappointments, they will surely be well worth the effort.

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(Appendix follows)

Appendix

Items From the Childhood Anxiety Sensitivity Index and the Anxiety Sensitivity Index

1. I don't want other people to know when I feel afraid.
   It is important to me not to appear nervous.
2. When I cannot keep my mind on my schoolwork I worry that I might be going crazy.
   When I cannot keep my mind on a task, I worry that I might be going crazy.
3. It scares me when I feel "shaky."
   It scares me when I feel shaky.
4. It scares me when I feel like I am going to faint.
   It scares me when I feel faint.
5. It is important to me to stay in control of my feelings.
   It is important to me to stay in control of my emotions.
6. It scares me when my heart beats fast.
   It scares me when my heart beats rapidly.
7. It embarrasses me when my stomach growls (makes noise).
   It embarrasses me when my stomach growls.
8. It scares me when I feel like I am going to throw up.
   It scares me when I am nauseous.
9. When I notice that my heart is beating fast, I worry that there might be something wrong with me.
   When I notice my heart is beating rapidly, I worry that I might have a heart attack.
10. It scares me when I have trouble getting my breath.
    It scares me when I become short of breath.
11. When my stomach hurts, I worry that I might be really sick.
    When my stomach is upset, I worry that I might be seriously ill.
12. It scares me when I can't keep my mind on my schoolwork.
    It scares me when I am unable to keep my mind on a task.
13. Other kids can tell when I feel shaky.
    Other people notice when I feel shaky.
14. Unusual feelings in my body scare me.
    Unusual body sensations scare me.
15. When I am afraid, I worry that I might be crazy.
    When I am nervous, I worry that I might be mentally ill.
16. It scares me when I feel nervous.
    It scares me when I am nervous.
17. I don't like to let my feelings show.
18. Funny feelings in my body scare me.

Note. Each item from the Anxiety Sensitivity Index (ASI) is in italic type and appears immediately below its corresponding item on the Childhood Anxiety Sensitivity Index (CASI). Items 17 and 18 on the CASI do not have parent items on the ASI. ASI items copyright by Steven Reiss. Reprinted with permission.

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